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Technical Monthly – December 2012

MPACT Campaign

- **Management and Integration**
[LANL] Coordination meetings with NA-22 and NA-24 principals were carried out in Washington DC the week of December 10th, covering instrumentation and analysis activities of common interest. Opportunities to field test equipment at H Canyon were discussed under a leveraged NA-24 activity, this would allow NE to obtain important operational data at a much reduced cost given that NNSA is paying for the infrastructure support. The NA-22 call for proposals is expected to be released by the end of the month; NE participation in the review process will help to further coordinate the two efforts. The National Academies study on "Improving the Assessment of Proliferation Risk of Nuclear Fuel Cycles" has been given a three month no-cost extension, with final report expected by early summer.

MPACT for Advanced Fuel Cycle

Microcalorimetry

- [LANL] Significant progress was made integrating the new high event-rate pulse processing code into the spectral analysis software. A summary of work-to-date on how uncertainty in constants of nature affect measurement uncertainty limits for gamma-ray spectroscopy analysis was prepared. An internal peer-review session was held and revisions were made to a journal article for the IEEE Transactions on Nuclear Science, per reviewer comments. The article was resubmitted for final acceptance.

Electrochemical Sensor

- [INL] Chemical stability tests were performed in two molten salt systems in order to determine the stability of ion exchanged gadolinium in conduction planes of beta double prime alumina sensor material. New test fixtures were constructed for the sensor probe assembly. Ion exchange and annealing steps were conducted for sensor probe preparation. Micro focus XRD analysis of Gd ion exchanged and annealed Na beta double prime alumina was conducted to determine if the beta double prime phase is

stable as a function of annealing at 850 C for 4 hours. The analysis is done and we are waiting on the results.

Fast Neutron Multiplicity Analysis

- [INL] A revised Statement of Work for the contract with the University of Michigan was completed. The U. of Michigan has now started working with us on this year's efforts. Ten large sized detectors will be used to support benchmark tests. Needed software was developed to process the list-mode data that both the U. Michigan and INL data acquisition systems will be generating. This software will allow us to determine the multiplication of the assay items under test.

MPACT Analysis Tools

Multi-isotope Process Monitor

- [PNNL] Analysis of a set of gamma-ray spectra collected with a medium-resolution LaBr3 spectrometer continued. Activities emphasized time-dependent energy calibration in preparation for multivariate analysis. The primary objective of the analysis is to assess the impact of energy resolution on the MIP monitor approach by comparing the results at moderate resolution (LaBr3) with those at high resolution (HPGe).

Safeguards and Security by Design

Used Fuel Storage Security Analysis, Guidance, and Best Practices:

- [LANL] Efforts during have focused on continued engagement with DOE-HQs working toward approval for the WINS workshop, discussions with LANL "Contracts" to make certain delays in the LANL/WINS contract while waiting for workshop approval, will not force a re-write, and preparation of an abstract for the summer INMM conference.
- [SNL] Work continued on developing a R&D plan for the milestone report. Paper was completed for the International High Level Radioactive Waste Management Conference, April 2013 in Albuquerque. Abstracts for IAEA Global Security Conference (July in Vienna, Austria) and PATRAM

2013 (September in San Francisco) were completed.

PTRA – Analysis Framework and Fundamental Studies

- [LANL] Efforts concentrated on process estimation, game theory, risk communication, cataloging, Extendsim modeling, and spent nuclear fuel modeling. Process estimation focused on estimating aspects of time, cost, and footprint for small reprocessing facilities. Cataloging the information needed (inputs, outputs, reaction rates, etc.) for the reprocessing step of our fuel cycle model continued. Work continued using MCNP6 to estimate delayed-neutron and delayed-photon dose-rates for chemical processing of spent fuel. TAMU staff generated an online survey to test the best practices developed from the literature review reported previously. They are currently alpha testing the survey and will release to test groups. In preparation for the site visit to LANL in January, the NPS team concluded their background review of related work on the nuclear fuel cycle, including documents shared by LANL and researchers at LLNL, UT Austin, and Texas A&M.

For more information on MPACT contact Mike Miller (505) 667-3335